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The EXTENSION ENTOMOLOGIST

M. L. Wilson, Director of Extension Service, while Under Secretary of Agriculture, wrote on What Are the Objectives of Continuing Education? in Rural America (September 1939). "Much of our emphasis on science today," he says in part, "is upon its technology and its economic value. Unfortunately we don't have much science taught in the schools and colleges from the standpoint of the cultural satisfactions which grow out of being close to nature and understanding it. The people today, nevertheless, possess a high degree of latent amateur interest in science. Science news releases are read eagerly. Continuing avocational education should capitalize upon this fine opportunity. For instance, there is great opportunity for placing dignified science exhibits, which might properly be called science observation stations, along the roads and highways of the Nation wherever there are interesting or inspiring objects to be seen. If we plan for it we could open up the book of nature with a kind of language that everyone can understand so that all people who travel in automobiles could read nature wherever they go; and we could become a nation of naturalists who derive great inner satisfactions from seeing and knowing about the forces which have made the surface of the earth and evolved the life that inhabits it. There are already the beginnings of a movement to humanize science and develop its cultural aspects."

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND
EXTENSION SERVICE, COOPERATING

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UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C.

THE EXTENSION ENTOMOLOGIST

Issued by the Extension Service and the Bureau of Entomology and Plant Quarantine cooperating with other Federal and State agencies in the furtherance of extension work in entomology.

M. P. Jones
Senior Extension Entomologist

PERSONNEL

Texas.

Mr. R. R. Reppert, extension entomologist in Texas since 1920, died of heart failure March 13, 1940. He was born in Valley Falls, Kans., was a graduate of Baker University and Kansas State College of Agriculture, served as a methodist missionary in Korea from 1908-14, and worked with the Virginia Crop-Pest Commission before going to Texas. Mr. Reppert's death is a great loss to the Extension Service, and he will always be remembered as one who devoted much time to helping that third of the people who have been less fortunate in accumulating worldly goods.

Cameron Siddall, assistant extension entomologist, has been appointed extension entomologist to fill the vacancy created by the death of Mr. Reppert and will take over the work carried on under his leadership in addition to continuing with his cotton insect control work.

Iowa. It has come to the attention of this office that Mr. Lewis T. Graham was appointed half-time assistant extension entomologist in Iowa on April 1, 1939.

Nebraska. Mr. Don B. Whelan will serve as assistant extension entomologist from February to September, 1940. Extension work is not entirely new to Mr. Whelan, as he served as extension entomologist in Michigan from 1915 to 1919, and in Idaho from 1921 to 1923.

United States Department of Agriculture. M. L. Wilson became Director of Extension Work on February 1, 1940. At the same time C. W. Warburton became Deputy Governor of the Farm Credit Administration.

Ohio. Mr. Judson J. Beougher will serve as assistant extension entomologist during the summer, his appointment to start May 1.

ANNOUNCEMENT OF MEETINGS

June 20, 21, and 22, 1940. Pacific Slope Branch, American Association of Economic Entomologists. University of Washington, Seattle.

August 18-23, 1940. Rocky Mountain Conference of Entomologists, Cameron Pass Camp, Colorado (75 miles west of Fort Collins.).

September 1940. International Great Plains Conference of Entomologists, Lethbridge, Alberta, Canada.

November 1940. Eastern Branch, American Association of Economic Entomologists, Atlantic City, N. J.

November 22-23, 1940 (tentative). Cumberland-Shenandoah Valley Fruit Conference, Martinsburg, W. Va.

December 27-31, 1940. American Association of Economic Entomologists, Philadelphia, Pa.

FORMER 4-H CLUB MEMBERS AT COLLEGE

A survey has just been completed by R. A. Turner of the Federal Extension Service which shows that 37.78 percent of the students now enrolled in agriculture and home economics at the agricultural colleges in the Central States are former 4-H Club members.

The actual number of former 4-H Club members enrolled in 1939-40 is 6,934 which, when compared with the 751 reported in the first survey made in 1927-28, clearly indicates a definite trend. Therefore, a gain of 823 percent was reported over the period of 12 years. In the more recent years the increase in the relative number of club members enrolled exceeded the increase in the relative number in the student bodies as a whole.

Illinois, with 49.53, reported the largest percentage of students who were former 4-H Club members. Indiana ranked second with 47.94 percent; Nebraska third, with 44.79; Kansas fourth, with 43.32; and Iowa fifth, with 41.56.

Many of these students made their first contact with the agricultural college through their 4-H Club activities. It is probably true that the awarding of scholarships to 4-H Club members has been a factor in encouraging attendance at the State colleges of agriculture. It is evident, in view of these data, that the 4-H Club movement is fostering a desire on the part of 4-H Club members to obtain additional scholastic training and is directing an increasing number toward the agricultural colleges.

--Extension Service Review, April 1940.

EXCERPTS FROM ANNUAL REPORTS

Boys' and Girls' Club Work

(Delaware Extension Entomologist's Annual Report, 1939)

4-H Club work in beekeeping has been in effect for 3 years. Both enrollment and the number of colonies have increased. Of those starting the work, none has abandoned the project to date and a number are interested in taking it up. Four of the 4-H Club beekeepers are rather active in the beekeepers' association, and as time goes on will undoubtedly prove of value as officers in the organization. In spite of the rather poor honey flow in 1939, several members have obtained a sizeable surplus of honey. One member received an award at the Kent-Sussex Fair while competing with other beekeepers of the State. Less supervision is now being given the 3-year bee-club members, and during 1940 more time will be spent with those beginning the project and those who have not as yet received a surplus honey crop.

The number of colonies owned by 4-H Club beekeepers has increased about 300 percent. Five New Castle County bee-club members report a profit of $97.69 from 12 colonies. The success of the third-year 4-H Club beekeepers has interested others in enrolling. One, and possibly two boys, entering beekeeping plans to transfer his bees to modern hives in the spring. It is hoped to make this a demonstration.

Entomological Schools for County Agents

(Idaho Extension Entomology Annual Report, 1939)

During the summer of 1938, the extension-division entomologists conducted garden insect control demonstrations in several of the counties of the State in cooperation with the county agents. After these demonstrations, several agents reported that the meetings had caused a decided increase in the number of inquiries made at their offices concerning insect control. Many of the problems presented by these inquiries were not well understood by the agents, who requested that a school for the purpose of studying insect problems be started. This was done during March of 1939. The agents were brought together in small numbers by districts. The schools were held at Parma, Jerome, Pocatello, and Moscow.

Methods.

1. Laboratory type of gross and microscopic examination of each species of economic importance found in each county. Request each agent to examine carefully the insect specimens with the thought in mind that these insects will be seen in the field later, and to select characters that will aid them in their identification in the field.

2. A brief discussion of the types of mouth parts of insects and the relationship of the mouth parts to feeding habits and control methods. Illustrate by a word picture the injury to a specific crop by a specific insect; for example, the appearance of potatoes after attack by the Colorado potato beetle, and the relationship of that feeding to the application of arsenicals for control; the effect of aphids on cabbage or other crop, and the relationship of that feeding to the use of pyrethrum sprays in aphid control.

3. Discuss in detail the control of three or four insects in each district emphasizing the relationship of the biology of the insect to control. Impress agents with the importance of timeliness in application of control measures. Lead this discussion so as to provoke questions from the agents.

4. Emphasize the importance of following the recommended measures in each county.

5. Describe the limits of usefulness of several of the insecticides such as lead arsenate, sodium arsenite, pyrethrum, and rotenone, and suggest to the agents that they help in getting these newer materials stocked in the stores of their counties, so that when we or they make recommendations for their use the materials can be obtained by the grower.

6. Request a discussion of how the department may be made more useful. What bulletins do agents need in their county?

City Campaign To Eradicate Red Harvester Ants

(Oklahoma Extension Entomologists' Annual Report)

An ant-eradication campaign was conducted this year in the city of Frederick in cooperation with C. F. Stiles, extension entomologist, and local forces including the vocational agricultural teacher, Mr. Floyd King, city and chamber of commerce officials, National Youth Administration, and Ronald Dahms, representing the Oklahoma Experiment Station. Some poison materials were also furnished by the United States Forest Service.

Our first problem was to run some experiments to determine more definitely the best treatment to use. A large number of anthills were treated at first with carbon disulphide for comparison with calcium-cyanide dust. This experiment was carried on with Floyd King as super-

visor under the supervision of C. F. Stiles. Results of the test indicated conclusively that carbon disulphide was the more effective remedy to use. However, since the United States Forest Service had donated a quantity of cyanogas, this material was utilized also during the campaign that followed.

A diagram map of each of the 285 blocks in the city was prepared. A captain or committeeman in each block was appointed to serve, his duty being to survey each respective block and designate the location of each anthill. The maps were then turned in to the supervisor after completion. N. Y. A. boys, W. P. A. workers, and city employees were then organized into crews to cover the entire city and treat all anthills designated on the maps.

Ronald Dahms, from the Lawton Experiment Station, spent considerable time here during the campaign making a record of the experiments, which will probably be the basis of a bulletin to be published on ant eradication methods.

Individual anthills had to be treated from three to six times in order to get complete eradication. This was necessary because of impervious subsoil in this immediate vicinity which caused the ants to scatter in wide beds beneath the surface rather than to penetrate deep into the earth.

The most effective treatment was first to saturate the anthill with water preferably late in the afternoon before treatment the next morning. Pour in 4 ounces of CS_2 and immediately close the entrance by covering with a spadeful of soil. Press firmly, and wet well with water to retain gas fumes.

If ants become active within 6 to 9 days, the treatment should be repeated until eradication is complete.

Wonderful cooperation was received from the citizens of Frederick in ant eradication work. The immediate incentive for this fine cooperation was the death last year of a small child, the 13-month-old son of Mr. and Mrs. Charles Flowers. The sting of red-harvester ants was the cause. This death and the injury to many other children built up much interest in this project.

Because of the serious infestation before the eradication campaign, children could not play in safety, it was impossible to beautify lawns in competition with tireless red ants clipping off all grass in the vicinity of their "beds."

Results of this campaign were very gratifying. Practically all ants within the city limits were exterminated. The campaign even spread to many farms in the county where eradication of ants was completed by the same methods used in the campaign.

Report of Montrose County Agent of Psyllid Project

(Colorado Extension Entomologists' Annual Report, 1939)

Potato spraying for psyllid and flea beetle was in general a successful program for the first time in 1939. The county agent and the extension entomologist were responsible for its success. Circular letters, newspaper articles, educational meetings, and continual field work with the operators of spray machines were the means employed to get results.

In 1938, there were only four good sprayers in the county and eight of miscellaneous character. In 1939, eight new high-pressure machines were purchased. We still have an insufficient number necessary to spray the potato, bean, sugar-beet, and other crops at the right time. With but one or two exceptions, potatoes that were not sprayed for psyllid yielded less than 70 sacks to the acre. I haven't found a grower who hasn't considered the cost of his spray program the best investment he made.

Andy Barslund on Bostwick Park, who bought a new sprayer in 1939, had this to say: "Even at the present price of spuds, I have paid for my sprayer several times this year. I wish I had bought it a year or two before."

Although flea-beetle infestation was not so severe this year as last, control was very good. Very few growers who sprayed have any off-grade potatoes because of beetle tracks or slivers.

A check-up with insecticide dealers reveals that the following amounts of spray material was used in 1939:

Zinc arsenite	42,290 pounds	at 14 cents	$ 5,920.60
Liquid lime sulfur	26,100 gallons	at 23 cents	6,003.00
Dry lime sulfur.	580 pounds	at 9 cents	52.20
Lead arsenite	1,280 pounds		
Black Leaf "40"	52 gallons		
Black Leaf "155"	54 pounds		
Total acres sprayed, all covers			14,430 acres

It is estimated that the following amounts were used for potatoes alone:

Zinc arsenite	32,000 pounds	at 14 cents	$ 4,680
Lime sulfur	20,000 gallons	at 23 cents	4,600
Sprayers, 8,000 acres all covers at $1.			8,000
Cost of program			$17,280

There were about 3,500 acres of potatoes protected. Comparison of check plots would show 50 sacks an acre to be a very conservative estimate of saving due to spraying, or a total of 175,000 sacks, and at a cost of 60 cents would give a money saving of $105,000.

Fruit Insect Control

(Indiana Extension Entomologists' Annual Report, 1939)

Factors that determined inclusion in the year's program:

In a 200-acre orchard in southern Indiana the cost of producing a bushel of apples computed over an 8-year period proved to be 77.75 cents a bushel. It is significant to note that of this amount 39.60 cents was chargeable to insect and disease control and 33.47 cents to codling-moth control alone. Although it is true that the worm population in this particular orchard was higher than in the average Indiana orchard, nevertheless, the figures clearly illustrate that insect control is a limiting factor in the apple-growing business and that success or failure in pest control usually means success or failure in the enterprise as a whole. The truth of this statement is borne out by the fact that those orchardists who have succeeded are those who have adopted recommended spray schedules and are making an effort to understand the fundamental principles underlying orchard insect control.

Since fruit growing in Indiana is a $20,000,000 a year enterprise, it can be readily seen that codling moth plus the many other insects truly do constitute major problems of control, and they show the need for an increased amount of extension work on this project.

Most of the work on this project phase was carried out through 23 meetings involving fruit growers from 46 counties. These 46 counties embrace all those containing commercial orchards of any importance. The meetings were held in cooperation with Monroe McCown, extension horticulturist. Practically every meeting was conducted on a discussion basis, the growers expressing their own views, ideas, and experiences. Other methods used to promote the work were the spray-timing service, correspondence, identification of insects, preparation of spray schedules and bulletins, orchard tours, and individual visits. Practically all of the time spent at winter meetings was given over to discussions of better control through the use of more efficient codling moth sprays.

In addition to the winter meetings, seven demonstration spray plots were conducted in northern Indiana. Seventy-five growers viewed the results obtained in these blocks, and many have adapted some of the spray schedules demonstrated. Several of these plots involve the use of nicotine preparations, which have more practical application in northern Indiana than in some other parts of the State. According to a questionnaire, about 700 acres of apples were sprayed with nicotine preparations last season.

Spray-timing service was rendered as usual. We are making an attempt to persuade growers to obtain their own spray-timing information by means of codling-moth bait traps, and last year more than 75 orchardists did use this method. There were 670 who asked for our mimeographed instructions on making and using these devices.

Hemipterous Cotton Insect Exhibit

(Arizona Extension Entomologist's Annual Report, 1939)

Since the major problem in the Salt River Valley at the present time is hemipterous insect pests of cotton, an exhibit of these pests was prepared and placed in each of the 28 cotton-gin offices in Maricopa County. Ten additional exhibits have been distributed to the Triple A office and leading finance organizations in the county and one to each of the county agricultural agents in other cotton-growing counties. This exhibit includes the five most important species attacking cotton, and cotton bolls and shows damage done by these insects. A pair of each species, showing variations, is mounted in a 6-inch test tube, the five test tubes are mounted on a cardboard approximately 18 by 25 inches and properly labeled. A brief statement of control measures and a picture showing the proper method of applying insecticides for control of these cotton insect pests is also included.

These exhibits, located in places commonly visited by cotton growers in transacting their business, should enable growers to become familiar with the insects that are causing damage to cotton and also with the type of damage done. This knowledge is essential for the intelligent use of recommended control methods.

VEGETABLE INSECT CONTROL PUBLICITY

R. W. Leiby, Extension Entomologist, New York

The publicity phase of our extension work was done through (1) the 24 issues of the Weekly News Letter mailed to county agents and research workers during summer months, (2) special articles to county agents for use in their monthly Farm Bureau news issues, (3) press articles, (4) radio talks, (5) extension and station bulletins, (6) insect exhibits at county fairs, and (7) public talks.

The Weekly News Letter comprised a total of 101 single-spaced mimeographed pages. Aside from being timely and informative regarding vegetable insects, their appearance and development in various parts of the State, it serves for the year as a bound reference volume on the status of such insects.

Eleven articles on vegetable and field crop insects were mailed to county agents. With most articles, column-wide mats illustrating the stages in insect development were offered to agents for use with the articles in Farm Bureau news publications or in their newspapers. (These mats cost about 3 cents each in lots of 50.) They are readily prepared from a zinc etching made from suitable line drawings, and greatly enhance the reading of the article they accompany. They have also been used in 4-H publications without an accompanying article but with a suitable legend on control of the insect concerned.

An appreciable number of articles were used by county agents in various ways, and it is felt these accomplished a positive good. Copies of these articles also were used extensively in answering office correspondence.

Six special articles were prepared for individual use of as many county agents in their county press or in an issue of their news. These articles concerned insecticides and insect problems peculiar to the county.

Eleven press articles were prepared and released to the department of information and publicity. Press clippings indicate that they were widely used. In two articles illustrative mats accompanied the stories, which were released to a total of 750 newspapers. The department of publicity estimated that one of these stories reached 1,500,000 readers.

Four radio talks were given over stations WGY and WESG. Seven additional radio briefs were supplied to the information office of the extension service.

Three extension bulletins on vegetable and field-crop insects were revised during the year.

The extension insect exhibit was used by three county agents in as many counties during the year. It was displayed also at the Syracuse meeting of the State vegetable and potato growers' meeting in connection with the Cornell and Geneva exhibits. Insect exhibits invariably attract public attention and afford easy opportunity for extension contacts and consequent explanations of insect control.

Four talks of a scientific nature not mentioned above were given during the year.

TIMELY TOPICS

Chemical Studies of Devil's-Shoestrings

The occurrence of rotenone in the roots of Tephrosia virginiana, commonly known as the devil's-shoestrings, which is the most abundant species of Tephrosia indigenous to the United States, has stimulated interest in this insecticide-bearing plant. Except for the original work by E. P. Clark of the United States Bureau of Entomology and Plant Quarantine, which first revealed the presence of rotenone, little chemical work on the constituents of the root of this plant has been reported. L. D. Goodhue and H. L. Haller, also of the Bureau, have been engaged on this problem recently, and will soon issue a paper describing their findings. They worked on freshly harvested and on dried roots from plants selected from breeding experiments designed to increase the insecticidal value. The roots contained 7.4 percent of materials soluble in chloroform, of which about one-third proved to be rotenone. From the resinous portion of the extract, inactive deguelin was obtained, and, finally, also an oil containing sesquiterpenes and glycerides. The forthcoming paper will give details concerning the various fractions into which the original extractives were divided.

Analysis of Commercial Dihydrorotenone

Dihydrorotenone is the only derivative of rotenone that retains the high insecticidal action of the parent compound. It is more stable than rotenone toward oxidation in the presence of light and, mainly because of this advantage, is being produced commercially. On a commercial scale the catalytic hydrogenation of rotenone does not always proceed to give a quantitative yield of dihydrorotenone, but instead yields a group of non-toxic compounds comprising rotenonic acid, dihydrorotenonic acid, and dihydrorotenol. The amount of dihydrorotenone obtained is now being judged by the insecticidal effect as determined by the Peet-Grady method using houseflies. Mr. Goodhue and Mr. Haller have examined the physical and chemical properties of dihydrorotenone and the other materials mentioned with the object of finding an easy method of determining the dihydrorotenone in the mixtures. They find that the Goodhue red-color test is given only by the desired compound, dihydrorotenone, and not by the other undesirable ones. This colorimetric method is therefore suggested as a means of determining dihydrorotenone in order to obviate the necessity of resorting to the more tedious biological test.

Toxicity of Insecticides to Honeybee Varies With Concentration

L. M. Bertholf, of Western Maryland College, has found in the cooperative study on the effect of insecticides on honeybees that, of two doses containing the same total amount of lead arsenate or calcium arsenate but varying in concentration, the one containing the more highly concentrated suspension is more toxic to honeybees than is the one containing the lesser concentration. He also reports that phenothiazine, in dosages covered by his observations, has no toxic effect that can be detected by the methods used, this in spite of the fact that the largest doses given were probably much larger than a bee would ordinarily get by sucking up a load of the regular spray mixture. He has further found that tartar emetic is toxic to bees and that the median lethal dose lies between 12 and 24 micrograms per bee. This corresponds to about 4 to 8 micrograms of antimony.

Methyl Bromide Fumigation Controls Cyclamen Mite

In a series of fumigations performed by F. F. Smith, of the Beltsville, Md., laboratory, in cooperation with Randall Latta, of the Division of Control Investigations, it was shown that fumigations of cyclamen, delphinium, and snapdragon with methyl bromide killed the cyclamen mite (Tarsonemus pallidus Banks) in all its stages without causing injury to the plants. On the basis of these tests it was concluded that a fumigation treatment of 2 pounds of methyl bromide per 1,000 cubic feet, with an exposure period of 3 hours at a temperature ranging between 60° and 70° F., constitutes the most practical treatment. It is planned, however, to continue these experiments in order to determine the possibility of obtaining an effective control at higher temperature.

Gladiolus Thrips Controlled With Reduced Dilution of Tartar Emetic

As the result of experiments performed during the season of 1939, G. V. Johnson, of the Beltsville, Md., laboratory, found that sprays made up at the rate of 2 pounds of tartar emetic and 4 pounds of brown sugar to 100 gallons of water gave a degree of control of gladiolus thrips, Taeniothrips simplex Morison equal to the formerly recommended dosage of 4 pounds of tartar emetic and 16 pounds of brown sugar to 100 gallons of water. Also, it was determined in a series of comparative tests, that a commercially prepared calcium antimony tartrate could be substituted for tartar emetic, provided an equal quantity of antimony was present in the spray.

Pea-Weevil Control

The Oregon Farmer (February 15) says that control measures for the pea weevil, developed by the Bureau of Entomology and Plant Quarantine and the Idaho, Washington, and Oregon Experiment Stations, have saved the Northwest pea industry. "Here are some significant figures from the Washington-Oregon canning pea section," it says. "In 1935 there were 12,000 acres devoted to peas, and while the acreage left uncut because of weevil damage was not recorded it was discouragingly large. The next year, 1936, however, which saw the researchers hold out some hope to the pea industry, acreage increased to 28,900 acres, and uncut acreage was placed at 6 percent. The next year, which saw some actual control work, 38,000 acres were devoted to peas, and loss was cut to 1.9 percent. The next year, 1938, on 34,000 acres, extensive dusting brought a still further reduction in loss -- to 1.1 percent. In 1939, with acreage at 32,000, uncut acreage was reduced to 0.7 percent. Looking at the 1939 record from the other side it means that control was 99.3 percent complete in the big canning pea district. The year was one of unusual weevil abundance, so had there been no control, damage would have been tremendous. It is doubtful if anywhere in the insect control field is a higher degree of efficient control being secured....."

Relative Value of Different Sprays and Dusts Against Mexican Bean Beetle

During the course of insecticide tests against the Mexican bean beetle, N. F. Howard and R. H. Nelson, of the Columbus, Ohio, laboratory, Bureau of Entomology and Plant Quarantine, found that sprays composed of cube, timbo, or derris, containing 0.01 percent rotenone, were almost as effective as sprays containing cube which contained 0.015 percent rotenone, and that no outstanding or consistent differences were apparent in the efficiency of the sprays derived from the three different sources of rotenone. In these series of tests, the spray composed of cube containing 0.015 percent rotenone was used as a standard of comparison, since it gave consistently good control of the insect. The addition of bentonite

and vegetable oil to sprays composed of cube and containing 0.01 percent of rotenone did not improve the toxicity of such sprays to the insect or increase the insecticidal effect. Sprays composed of cube containing 0.02 percent rotenone combined with Bordeaux (4-6-50) 2 months before they were used, retained toxicity and were highly effective against the Mexican bean beetle. Nicotine-bentonite sprays showed no promise against this insect. Four paris-green homologues prepared by F. E. Dearborn, of the Division of Insecticide Investigations, in 1938, and consisting of peanut-oil green, sulfurized peanut-oil green, corn-oil green, and sulfurized corn-oil green, to all of which sodium lauryl sulfate was added as a wetter and spreader, were strongly phytotoxic. Phenothiazine alone and phenothiazine-AS_2O_3 gave a fair degree of control, but foliage injury was noted, especially when the phenotiazine was used alone. A dust mixture composed of cube and talc, containing 0.5 percent rotenone, was effective. A dust mixture composed of derris and talc, containing 0.5 percent rotenone, appeared superior to a dust mixture containing 60 percent sodium aluminum fluoride with talc as a diluent, when used with a power duster. A dust mixture containing sulfur nitride with talc as a diluent caused foliage injury. Results with and without hoods were not sufficiently consistent to enable the determination as to whether the use of these mechanical aids to the application of dust mixtures on beans is warranted.

Sulfur-Cube Ineffective Against Brown Winter Tick

H. E. Parish, of the Menard, Tex., laboratory, finds that spraying cattle infested with the brown winter tick, Dermacentor nigrolineatus (Pack.), with the following mixture resulted in little or no kill: Wettable sulfur, 100 pounds; derris powder (5 percent rotenone), 10 pounds; water, 1,000 gallons. This is the formula found effective as a dip for controlling the short-nosed cattle louse.

Treatment of Screwworm Wounds

Experiments conducted by the Menard, Tex., laboratory during the past 2 years have shown that a crystalline chemical known as diphenylamine is an excellent remedy for protecting the wounds of livestock against infestations of the screwworm Cochliomyia americana C. and P. It is also effective for killing larvae infesting a wound if the worms are not over 3 days old.

In the treatment of wounds for screwworm control, the chemical, at present used in large quantities in the dye industry, is first pulverized to a powder fine enough to permit at least 50 percent of it to pass through a 40-mesh sieve, and then dusted on the wounds. It is not a fly repellent and does not prevent the females from laying eggs, but it is highly toxic to the young larvae which are killed in a short time after they hatch. The material adheres well to the tissues, and often one application will prevent infestation of the wound until it has healed. The recommended practice in using diphenylamine, however, is to apply it to the wound every third day until it has healed, since some of the treated wounds may become infested

after the first or subsequent applications. Treatment every third day permits a safe interval between treatments, because none of the wounds under this schedule of treatment would contain larvae over 3 days old and the chemical would destroy these. If infested animals have not been treated or have escaped notice for more than 3 days, it is necessary to kill the worms with benzol before applying diphenylamine.

This new remedy has been found to be two or three times more effective for preventing screwworm infestations than pine-tar oil, the material formerly recommended for this purpose by the Bureau of Entomology and Plant Quarantine.

Detailed information on the use of diphenylamine for screwworm control is given in United States Bureau of Entomology and Plant Quarantine circular E-481.

Ethylene Dicholoride Emulsion for Control of Peach Borer

Oliver I. Snapp, Fort Valley, Ga., reports that a peach grower who operates on a large scale used 6,000 gallons of ethylene dichloride emulsion prepared on the farm. He obtained 100 percent kill of the borers, with savings of 25 percent for materials and 80 percent for labor, as compared with the cost of paradichlorobenzene treatment which he used theretofore.

Some Codling-Moth Larvae Remain in Hibernation Throughout Summer

M. A. Yothers, of the Yakima laboratory, Bureau of Entomology and Plant Quarantine, reports finding, in August 1939, hibernating codling-moth larvae in the soil attached to or near tree trunks. These larvae have been there since the fall of 1938, and show no indication of pupating this season. Literally hundreds have been found in a neglected orchard, which had a large crop last year but has practically no crop this year. They can be readily distinguished from this year's worms, their white color contrasting strongly with the pinkish color of the new worms.

Savings Through Grasshopper Control Work Over a 5-Year Period

In reviewing the results of grasshopper control work for the last 5 years, it is found that the total of the estimated savings and losses amounts to $757,501,833, or more than three quarters of 1 billion dollars. It is seen that the average annual problem for the 5 years has amounted to $151,500,366. The following represents savings per bait ton during the last 5 years: 1935, $700; 1936, $880; 1937, $1,290; 1938, $1,255; and 1939, $836. The decreased values during 1939 resulted from the baiting for protection of nearby crops of range and idle lands where savings are necessarily less than in good crop sections.

Grasshopper Campaign

Crops and range land valued at nearly $7,000,000 was saved from grasshopper damage in Montana last summer by an extensive control campaign. This campaign was waged at a cost to counties, exclusive of Federal funds, of $35,617.51, according to Dr. H. B. Mills, State entomologist at Montana State College and State leader of the control project. From the standpoint of results obtained per each dollar spent, the 1939 campaign was the most successful one conducted in the last 3 years, Dr. Mills said. This success is attributed by him to two principal factors: First, farmers themselves participated more extensively than ever before, 9,588 of them spreading poison bait, compared with only 3,086 using bait in 1938; second, the smooth working relationships among various Federal, State, and county organizations and individuals. Cooperating in the control project were the Federal Bureau of Entomology and Plant Quarantine, Indian Service, Montana Extension Service, Reclamation Service, W. P. A., division of grazing, county governments, and individuals. (Great Falls Tribune.)

Wheelbarrow Duster

A new wheelbarrow type of row-crop duster is powered by the traction of the front wheel. The power is transmitted on a V-belt and pulley to a small dust-blower unit on the wheelbarrow frame. Two nozzles will simultaneously dust two rows of plants, and there is a guard to protect the plant foliage against injury. (Country Home Magazine, Aug.)

Planes War on Insects

The airplane has been pressed into other kinds of warfare than that between nations. One form of aerial warfare is directed against destructive insects. In Canada the air express services have been carrying shipments of insect parasites which have been released in British Columbia to fight the pea moth that has destroyed the dry-pea industry. In the Okanagan, the codling moth has also come for a counteract from parasites, the codling moth being destructive in the apple and pear orchards. These insect parasites are gathered from all over the world, and the fast delivery which the airplane affords is a major factor in enabling them to reach infested areas while still virulent. The parasite lives only a few days after it reaches maturity. (New York Times.)

Seedless-Fruit Sprays

The technique of producing fruit from unpollinated flowers -- parthenocarphy -- advanced another step when scientists of the Department of Agriculture found that two new growth substances, napthalene acetic acid and napthalene acetamide, are much more effective as pollen substitutes than substances used in previous tests. The experiments, conducted by the Bureau of Plant Industry, renew interest in parthenocarpic fruits, which

develop normally but produce no embryos or seed. Most of the previous work, and all with the two new substances, has been with the holly plant. In the tests, conducted by Dr. F. E. Gardner and P. C. Marth, the female plants were sprayed with weak solutions of the substances and covered with glassine bags to protect against pollination. Both greenhouse and outside holly plants were sprayed. Using an 0.01-percent solution, the strongest of three solutions used, 85 to 98 percent of the flowers sprayed set fruit. The naphthalene acetamide was slightly more effective than the naphthalene acetic acid. The Department will continue experiments with other fruits and substances. Production of parthenocarpic fruits -- free from seeds -- would be commercially desirable in some fruits such as tomatoes, which do not have a hard seed covering about the embryo. At present the chemicals are expensive, yet because of the low concentrations needed, the cost is not prohibitive.

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